Quarterly Report – Public Page

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Prepared for: *Pipeline & Hazardous Materials Safety Administration (PHMSA) and Pipeline Research council International (PRCI)*

Project Title: *Consolidated Program for Development of Guidelines for Safe and Reliable Pipeline Transportation of Ethanol Blends, #323, #325, & # 327*

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Current Status

Pipelines are, by far, the most cost-effective means of transporting large quantities of fuel over long distances. Fully establishing the reliable and safe transportability of ethanol is critical to the viability of pipelines as the primary transportation mode. Guidelines, and ultimately, standards are needed to ensure that practicing engineers can maintain the integrity of the pipelines they operate and ensure the continuity of the service they provide. The major objectives of the proposed consolidated program are to:

- Quantify the effect of chemical variations in ethanol's tendency to cause corrosion and SCC.
- Develop data necessary to make engineering assessments of the feasibility of transporting FGE and FGE blends in existing pipelines in a batching or dedicated mode.
- Evaluate the implementation of various SCC/corrosion mitigation strategies
- Develop monitoring techniques to determine whether conditions are present to cause SCC initiation and growth.

The major results generated thus far are:

1. Stress corrosion crack growth rate of steel in simulated fuel grade ethanol is comparable to external SCC rate in near-neutral pH environment.
2. SCC growth occurs in ethanol-gasoline blends down to e-20, but not in E-10 or pure gasoline. Furthermore, once crack growth is established in simulated fuel grade ethanol, replacement of the ethanol by gasoline results in complete cessation of cracking. Subsequent replacement of gasoline by ethanol results in resumption of cracking after some time interval and additional loading.
3. Batching mode of operation where ethanol batch is alternated with gasoline batch is possible. The batching frequency and residence time issues need to be studied further.
4. Elastomeric materials exhibit reasonably low swelling in ethanol. However, both Viton and Low Swell Buna N elastomers exhibit extremely high levels of

swelling upon subsequent exposure to gasoline and hence should not be considered for further testing. Some elastomers exhibit negative swelling due to leaching of components in ethanol.

5. The use of ultramicroelectrodes in fingerprinting ethanol needs to be explored further
6. Dissolved oxygen can be successfully monitored using a commercially available instrument and will be used in field monitoring after integration with a wi-fi enabled monitoring system.